

ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE

Defense Nuclear Agency
Bethesda, Maryland 20014

SUBJECT: Minutes of the Twenty-Fifth Meeting, Armed Forces
Radiobiology Research Institute Board of Governors,
11 January 1977

The Board of Governors

Lt Gen Warren D. Johnson, USAF	Director, Defense Nuclear Agency, Chairman, Board of Governors
VADM Willard P. Arentzen, MC, USN	Surgeon General of the Navy
LTG Richard R. Taylor, MC, USA	Surgeon General of the Army
Brig Gen Ernest J. Clark, USAF, MC	Director, Professional Services, Office of the Surgeon General, United States Air Force

Guests

Dr. J. P. Sanford	Dean of the Medical School, Uniformed Services University of the Health Sciences
Mr. Peter H. Haas	Deputy Director for Science and Technology, Defense Nuclear Agency
Dr. Marvin C. Atkins	Scientific Assistant to the Deputy Director, Science and Technology, Defense Nuclear Agency

AFRRI ATTENDEES

COL LaWayne R. Stromberg, MC, USA	Director
Col Darrell W. McIndoe, USAF, MC	Deputy Director
Lt Col Edwin T. Still, USAF, VC	Research Program Coordinator
LTC Hal F. Stolz, VC, USA	Chairman, Behavioral Sciences Department

The 25th meeting of the AFRRRI Board of Governors was opened at 0900 hours by Lt Gen Johnson, Chairman.

Lt Gen Johnson

"This will almost certainly be my final Board of Governors' meeting. The next Director, who will be a U. S. Navy Admiral, is scheduled to take over the Defense Nuclear Agency in April of this year. I want to express my appreciation to the Surgeons General for your support of AFRRRI the past several years. Working with you has been a distinct pleasure.

As I look downstream, I foresee further cuts, particularly in manpower. I hope that you will be able to continue your support in spite of the problems posed by any cutbacks. I am disappointed that we were unable to get approval for the expanded animal facility for AFRRRI. It is a highly important requirement and must be supported and pushed for in the future. I am confident that it will be approved, despite the difficulties associated with an unpopular issue."

LTG Taylor

General Taylor then expressed the appreciation of the Surgeons General to General Johnson, stating that in his opinion, General Johnson had been the most effective Director he had dealt with or known.

Lt Gen Johnson

General Johnson thanked General Taylor and then turned the meeting over to COL Stromberg.

COL Stromberg

1. MATTERS WHICH WERE COVERED AT THE LAST MEETING

a. "The animal facility was a primary subject of the last meeting and will be discussed later in the meeting as a specific item.

b. "The National Academy of Sciences Fellowship program has been instituted, and the first fellow, Dr. W.L.R. Cruce of Howard University, has begun his work in conjunction with Dr. M. Goldberg, of the Behavioral Sciences Department.

c. Staffing and Personnel. "For the past year, manning has been at a reasonable level although we are facing some difficulties in obtaining specific people for some slots. The cooperation from personnel people in the three services has been excellent, and we have been kept informed of current problems in manpower and staffing.

"At the last meeting, LTG Taylor recommended that we explore the possibility of establishing a policy that with respect to all medical service positions the service, branch, and specialty be immaterial. This was reviewed by manpower staffs at DNA HQ's and Department of the Army. An alternative procedure was recommended which allows us to make out of cycle changes in our JTD as we request necessary personnel. We have just begun this procedure and will report on its success at the next meeting.

"In view of the fact that additional manpower cuts over the next several years are highly possible, we are conducting a detailed survey on the feasibility of converting certain AFRRRI functions and/or activities to contractor operated. One of the services so studied is the Radiation Sources Division, continued operation of which with military personnel will not be possible if the present trend to close down DOD Reactor Operator training programs and associated career opportunities continues.

2. FUNDING

"Over the past several fiscal years, AFRRRI has had a progressive increase in its budget that reflects an enlarged and increasingly productive research program. However, this increase has lagged behind recent rates of inflation.

The reimbursable program is continuing, but is no longer increasing. We estimate that the reimbursable program will remain at approximately the current level of \$800,000 per fiscal year for the next year and then will gradually reduce as the nuclear weapons effects program continues to increase and diversify. By the time the expanded animal facility is functioning, the reimbursable program should constitute a negligible part of the AFRRRI budget."

3. AFRRRI RESEARCH RESULTS

a. Definition of the Mechanism of Early Transient Incapacitation.

"At the last BOG meeting it was reported that there was considerable doubt as to the reliability of casualty criteria for incapacitation. This was based upon several factors, one of which was the lack of knowledge on what constituted the basic mechanism underlying the phenomenon of transient incapacitation. Recent work has fairly clearly established that changes in histamine levels and responses to histamine in the central nervous system are involved.

It has been shown that radiation will result in histamine release. It has also been clearly demonstrated that the injection of histamine by itself will result in a form of incapacitation quite similar to that seen after irradiation, and, finally, anti-histamine does modify the incapacitation state.

"Further work in these areas should lead to a much more complete understanding of the basic mechanism of incapacitation and should provide a way to establish a more valid extrapolation model from animal studies to man.

b. Establishment of More Valid Incapacitation Criteria

"Recent work by the staff of the Behavioral Sciences Department has resulted in greatly increased understanding of the degree of incapacitation that can occur in stress situations. LTC Hal Stolz will present a brief summary of this work."

LTC Stolz

"The derivation of the presently accepted radiation casualty criteria by the Army Nuclear Agency was from AFRRI data. We believe these criteria are a much too conservative interpretation of the data. Permanent complete incapacitation (PCI) within five minutes after exposure for animals doing a non-stressing visual discrimination task occurs at an extrapolated free in air dose of 18,000 rads. Animals trained to the primate activity wheel experience PCI within 5 minutes at an extrapolated free in air dose of 8,000 rads. I should like to state that both these tasks are physically and mentally non-stressing for the trained primate. We further believe that the five minute time period is artificial and permanent incapacitation is not a realistic requirement to produce unit ineffectiveness under military conditions.

"In order to demonstrate the task dependency of incapacitating doses of radiation a new task was developed and preliminary data is available. This task is essentially the same task the 18,000 rad criteria was developed from with but one parameter changed (Response Time). The original task allowed the primate 5 seconds to respond to a light cue and select the proper button on a two button visual discrimination panel. Under observation these animals appeared to have time to waste after receiving the light cue. They would look over their shoulders and around their test chambers before attempting to perform the task, but before the five seconds was up they would look back at the panel and perform the task. With the new task the response time after cueing has been driven down to at, or near the animals response time (generally around 0.5 secs). Therefore, the animal does not have his casual time any more and must face the test panel at all times and be ready to respond immediately to his light cue. The animal sits and stares at the panel. The task requires constant mental alertness. Now, what does this do to our previously observed responses. Early Transient Incapacitation (ETI) with the original chaired animals occurs in 50% (ED₅₀) of the animals at 1620 rads

midline tissue dose. We have tested seven animals with the new (speed stressed) task (1150-900-800 x 2 and 600 x 3). All animals at 800 rads and above have shown temporary incapacitation. None of the 600 rad animals have shown incapacitation. Another interesting finding in these animals is that there were 37 separate instances of vomiting (vomiting in the plural not 37 single vomitions) and in the 35 of these instances occurring during periods of no incapacitation the animals continued to perform perfectly during the vomiting episodes.

"I would like you to observe a T.V. tape of one of the animals exposed to 800 rads which demonstrates both vomition and later transient incapacitation."

COL Stromberg (cont.)

"The whole problem of casualty criteria has been examined closely by a special panel during the past year. This panel, made up of a diverse group of scientific experts and experienced military commanders, has identified serious problems in the development of operationally valid casualty criteria. The basic requirements to look at the effects of radiation on entire units rather than on just individuals and to consider combined effects were clearly identified and have been established as primary goals of the current DNA biomedical research program."

Mr. Haas then reviewed briefly the relationship of the current DNA program to requirements established by SACEUR and how the results of the deliberations of the panel noted above helped to establish goals of that program. He noted that the studies being planned now will drive future weapons design, stockpiles, utilization, etc.

General Johnson then described how the work of AFRRRI will be the key to the design of new weapons to replace the many that are reaching the end of their stockpile life, stressing the importance of studies of collateral damage.

c. Diagnosis and Prognosis of Radiation Injury

"During the past year, the Biochemistry Department at AFRRRI has begun work on a blood test which appears to be related to radiation dose. On the basis of work first done in St. Louis, the staff of our Biochemistry Department has been testing the response of gallium binding to radiation dose. Preliminary results indicate that the degree of gallium binding is related to the dose of radiation and, further that the changes in gallium binding are stable with time, so that tests done hours to days after radiation injury give consistent results. In addition, data from St. Louis indicate that other diseases and injuries do not cause changes in this particular

test. This is of great importance because in all previous studies it has been found that radiation induced changes are small compared to changes induced by other disease or injury. This was the case in the initial studies done at this laboratory on the response of glyco-proteins to radiation injury.

"It was found in studies on samples from cancer patients receiving radiation that the glyco-protein patterns reflected the status of the basic cancer rather than the radiation injury. This formed the basis of our current program on the sero-diagnosis of cancer.

d. Sero-diagnosis of Cancer

"At the time of the last meeting, results of this program were presented to the Board, and it was stated that the program probably had a two year future. It was hoped that by the end of that time we would have been able to state fairly adequately whether or not the sero-diagnosis of cancer on the basis of glyco-protein changes was a valid test and useful clinically. Since then, and because of the success of the program, the National Cancer Institute has specifically requested that this laboratory continue its studies in conjunction with other studies done by, and sponsored by, that Institute. The objective of the National Cancer Institute is to develop a more accurate predictive model for cancer. As a result of this request, it is obvious that our small program in the sero-diagnosis of cancer will be continuing for several years."

Mr. Haas then interjected a question to the Surgeons General asking whether they felt it was appropriate for the AFRRRI to continue with this program.

General Taylor responded that he felt very strongly that this program was very important and could be defended easily. Speaking for the Board, he recommended that the AFRRRI continue supporting the National Cancer Institute in this effort.

Dr. Sanford, Dean of the Uniformed Services University of the Health Sciences (USUHS) remarked that the changes reported seemed to parallel those found in early infections and that he considered this work to be a most legitimate area for the DOD to support at AFRRRI.

4. PATIENT RADIATION

"Since the presentation at the last BOG meeting, the tissue bank of the NMMC and the National Cancer Institute's programs have ended, and we are not receiving requests for treatment of patients with whole body radiation from these two institutions. It is felt that there will be no radiations until these two institutions have reviewed their protocols in detail. Under these circumstances, before approval for any radiation will be given, the protocols will be presented to the Board of Governors. Several months ago however, we did receive an emergency request from Albany, New York to irradiate a patient in the cancer program there. This was done, the patient did very well, but succumbed to graft vs host disease at about 5 months post treatment.

"The graft vs host disease problem is a critical one in any whole body radiation injury and has been the subject of investigative work here at the AFRRRI for many years. In recent work done by the Department of Experimental Hematology, a small breakthrough has occurred in that we've been able to identify a factor that seems to differentiate cells which cause graft vs host disease from those which do not after transplantation. This is based upon the adherence or non-adherence of these cells to glass beads. It is too early to know if this will constitute a major contribution to the management of this serious problem. Since the phenomenon has been observed in rodents only, considerable work remains before this can be looked upon as a basis for modifying transplantation techniques in patients.

5. COORDINATION WITH THE UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

"At the present time, the AFRRRI's interaction with the medical school is in four areas:

"a. We are providing research laboratory space to the school for Dr. Aronow and several of his staff for his Department of Pharmacology. This has worked out very well, Dr. Aronow is an ideal guest and has brought scientific capabilities in the form of equipment and manpower skills with him.

It has been a distinct pleasure having him here, Dr. Sanford.

"b. We are negotiating for sharing Radiological and Industrial Safety. This is in large part driven by Nuclear Regulatory Licensing requirements for the handling of isotopes and other radiation sources which make it highly desirable to have a single broad license for several institutions. This works well at Walter Reed where a single license is held by the Center for all institutions and tenant commands. The National Naval Medical Center is not integrated to that extent but at a later time, an AFRRRI - Medical School joint agreement could form the basis for some degree of consolidation. We have not entered into a discussion with the Center at this time.

"c. The third area of cooperation is the field of education. The AFRRRI education program which combines nuclear sciences of combat medicine (nuclear weapons) and clinical medicine is already integrated into the medical school curriculum. However, the critical requirements that we must meet are current and cannot wait for the development of a medical school or faculty or facilities. We at AFRRRI plan to develop our program as rapidly as we can. It is very reasonable however, to coordinate with the school as we develop our curriculum and courses.

We do not envision an extensive joint research effort developing at this time with the school. A research effort may develop gradually over a several year period, but the other two areas of radiation safety, and education, as discussed above, are critical areas for cooperation over the next two years.

"d. Finally, AFRRRI, the school and other elements of the National Naval Medical Center are coordinating on computer plans. At the present time, AFRRRI has an extensive plan to improve our own computer resources. The ADP officials of AFRRRI, the medical school and all the tenant commands at the NNMC are meeting regularly, to insure that each institution is informed of the computer plans of the others and that needless duplication is avoided."

Dr. Sanford then stated how delighted he was with how well the arrangement for Dr. Aronow has worked out. He further stated that he appreciated the necessity for participation in medical education. He agreed that the research development for the time being is slow because of the requirements for developing the curricula, etc. for the school.

General Johnson then added that he felt very strongly that the Board of Governors must be involved in the determination of future AFRRRI school relationships.

6. LABORATORY UTILIZATION STUDY

"At the last meeting it was reported that the Office of the Director of Defense Research and Engineering had included the AFRRRI in a forthcoming laboratory utilization study. That study severely criticized the program that AFRRRI had begun in 1971 broadening its mission, and expanding its reimbursable efforts. The Defense Nuclear Agency wrote a reclama to the criticism, which was provided to the Surgeons General and to the President of the USUHS for review and comment. All three Surgeons General and the President of the USUHS agreed with the stated position of the Agency. A draft copy of the Laboratory Utilization Study was reviewed by a special investigating group of the House Armed Services Committee and was included in the comments made by that Committee to the Office of the Defense Director of Research and Engineering on medical research programs of the DOD, the DNA reclama was not

included. Since the time of the reclama, the nuclear weapons effects program of the AFRRRI has expanded further, and it is felt that the criticisms originally stated in the laboratory utilization study are even less valid than they were a year ago. Our position at the present time is that it is most appropriate for AFRRRI to be under the management of the Defense Nuclear Agency, and we request a review of this position by the Board."

LTG Taylor

"A decision was made in the early sixties to combine all weapons and radiation biology research into a single entity, AFRRRI. At the present time, the Army Medical Department has no other source for advice on operational problems, and I feel that it is absolutely essential that the AFRRRI be maintained in DOD and under the management of DNA to maintain a cadre of people knowledgeable in these effects and available when problems arise. It is in the national interest to have this capability, and we cannot expect non military organizations to contribute to these kinds of problems because of security considerations and the possible need to deployment of members of the staff of AFRRRI, if required. The DOD has to have a stable cadre and a resource which could be deployed when needed."

Mr. Haas

"I agree wholeheartedly and I further see the relationship of AFRRRI to the new school of medicine could be a help to accomplish this. However, we must continue to have medical personnel assigned to the AFRRRI. I have had to defend this position many times, and I desire the support of the Surgeons General in continuing to maintain this position."

LTG Taylor

"The relationship to the new school should be of mutual benefit, but the staff of the school also are not available for deployment as readily as the staff of an institute such as AFRRRI. I wholeheartedly support the position of the Agency at this time in regard to AFRRRI."

COL Stromberg (cont.)

7. EDUCATION

"At the last Board of Governors meeting General Taylor made a specific request that the AFRRRI assist the Army Medical Department in its educational program to increase knowledge on nuclear weapons effects at all levels throughout the Army Medical Service. At the present time we have had an extensive

in-house effort laying the ground work for such a program. We did not want to repeat an error that was made before, however, when a nuclear weapons specialty was established as a separate specialty in the Army Medical Services. Therefore, we have decided to assign this problem to the field of nuclear sciences and to our Nuclear Sciences Department. This department includes clinical nuclear medicine personnel and radiological physicists and already has had a mission to assist in the education program on clinical nuclear medicine operated by the National Naval Medical Center. The entire staff of the AFRRRI however, has been enlisted in this program and assists the Nuclear Sciences Department in accomplishing the basic goal. We will concentrate on educating nuclear medical physicians and nuclear medical technicians in all three services to be the experts of the next generation in this field.

"At the present time we have developed a syllabus for the course which can be used in educational programs. We now need identification of the proper groups to contact to arrange presentations from the Surgeons General. We are scheduled to present courses to the freshman class of the new school of medicine."

LTG Taylor

"We feel that it is very important that this information be made available to medical personnel at their first assignment and would be most helpful if it were available in the form of video cassettes that could be utilized by medical personnel in any medical facility anywhere in the Army."

COL Stromberg (cont.)

"We shall begin to prepare such material immediately."

8. ANIMAL FACILITY

"At the last meeting we reported on the status of the expansion of our animal facilities. At that time, we had a plan for building a 36,000 sq ft, four story building. It was deleted from the FY77 budget by the Senate because we had not gotten far enough along in the planning of the facility. We proceeded as directed with an A&E design and were able to come up with a much better facility than the original. We are now requesting a 32,000 sq ft facility, three stories high, which is less expensive than the original facility and more efficient. We are getting the same overall facilities, in terms of operating rooms and necessary animal rooms in this new facility as we would have gotten in the four story facility. Unfortunately, this military construction request has been delayed until the next fiscal year when it will be reconsidered.

It has been reviewed in detail by the Tri-Service Committee looking at the feasibility of a central facility. The delay is a problem to us because of our expanding research program and we are actively looking at ways to increase existing capabilities. The use of trailers which are expensive to purchase or rent, expensive to maintain, and very difficult to get approval to use, does not appear to be feasible. Borrowing space from other facilities in the area is not possible. The Walter Reed Army Medical Center does have space for certain species of animals, particularly dogs, but does not have space for other animals. There is no space at facilities here at the NNMC available to us. Reassignment of existing space within the Institute now used for labs is being examined. This would require deletion of some existing programs and probably cancellation of our existing relationship with the medical school. None of the rooms that could be used would meet existing legislation and could only be a temporary solution at best. It could be exceedingly expensive. Finally, a minor MilCon for construction of office space so that certain rooms could be permanently converted to animal space has been proposed. This would mean rehabilitation of those rooms, installation of new, air handling equipment and again, would be extraordinarily expensive. There does not appear to be any rational or reasonable alternative to expanding our animal facility as requested.

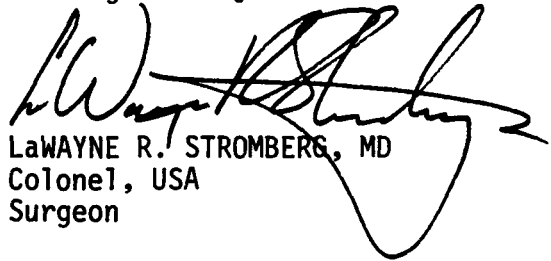
9. SECURITY

"At the present time, we have an active program for improving the security of AFRRRI. The nuclear reactor that we have is licensed by the Nuclear Regulatory Commission (NRC). The NRC has an active program for increasing security of all reactor facilities. The Department of Defense is likewise interested in such security and is developing new regulations governing or increasing security measures. A minimum program of security requires positive preentry identification, alarm and intrusion devices, perimeter guard systems, surveillance systems as major items. We have a program that includes a minor MilCon and acquisition of equipment, parts of which will be started this fiscal year.

Lt Gen Johnson

"As there will be a new Director for the Agency in April, it is essential that he obtains an education on the significance of the AFRRRI, that he understands what its problems are, its objectives, and goals. I feel that the Surgeons General can help me a great deal in this matter and I request your assistance."

Mr. Haas then went on to give an outline summary of materials available through the DNA relative to the ground combat threat in Europe. He offered separate briefings at the CODEWORD level for each of the Surgeons General, at their convenience. He went on to give highlights of that briefing and the Surgeons General requested a more detailed briefing at a future time. General Johnson also suggested that briefing on Nuclear Weapons Effects for medical students should be at the secret level for them to better understand the problems. General Johnson then went on to thank the Board for its participation in the meetings and the meeting was adjourned at 1145.



LaWAYNE R. STROMBERG, MD
Colonel, USA
Surgeon